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THE COTTONWOOD LEAF-MINING BEETLES IN SOUTHERN ALBERTA.

BY E. H. STRICKLAND,

Entomological Branch, Dominion Dept. of Agriculture.

Cottonwoods and other poplars have proved to be the trees best adapted for shade and ornamental purposes on the treeless plains of Southern Alberta and Saskatchewan. It is, therefore, to be regretted that every year the leaves of these beautiful trees are made unsightly by the presence of large blackened areas, which may extend over their entire surface. In some years hardly a leaf on badly attacked trees escapes this disfigurement.

By the middle of June an examination of the cottonwood trees around Lethbridge, Alberta, can hardly fail to reveal the presence of small groups of holes on the underside of the leaves, (Fig. 2) with perhaps a few smaller groups on the upper side also (Fig. 1, A).

A closer examination of these holes shows that they are never more than about 1 mm. in diameter and are polygonal in shape, being bounded by the finer reticulations of the leaf veins. They do not entirely pierce the leaf but extend to the upper epidermis, which appears as a transparent membrane when the leaf is held to the light. After a few weeks they become more circular in outline, and are surrounded with a cork-like growth.

These holes are the feeding punctures of the Cottonwood and the Poplar-leaf-mining beetles (*Zeugophora scutellaris* Suffr. and *Z. abnormis* Lec.).

The former beetle, which we shall consider more especially in this article, is a pretty little species, measuring 4 mm. long, with a bright yellow thorax and with black wing covers. (Fig. 3). This beetle feeds most abundantly on cottonwoods, though it is found sparingly on other poplars.

Weiss and Nicolay* in recording the occurrence of this beetle in New Jersey, where they state that it appeared first in 1919, describe it as a "European Poplar Leaf-miner." We are inclined to doubt whether this species has been imported from Europe. Mr. Criddle tells me that, from the earliest dates upon which he made observations on the cottonwood-infesting insects of Manitoba this beetle has been abundant, especially upon the native cottonwoods in river bottoms. This observation was made in 1903, when very few cottonwoods had been imported into Manitoba from elsewhere, and Mr. Criddle has noticed that the beetles do not spread rapidly to the imported trees. In Alberta our first personal record was made in 1913, but the inhabitants of Lethbridge informed us at the time that, in so far as they had observed, the cottonwood leaves were always more or less disfigured with black blisters.

Zeugophora abnormis is a beetle similar in size to *Z. scutellaris*, but it is entirely black. It is rarely seen on cottonwoods, but it confines its attention chiefly to Balms of Gilead.

*Ento. News, vol. 30, May, 1919.

Life-history and Habits of *Z. scutellaris*, Suffr.

On about June 15, the adults are found for the first time in the year feeding on cottonwood leaves. From then on to the end of the month their numbers increase rapidly. Although these beetles are apparently strong fliers they do not take readily to wing, but if disturbed they fall to the ground, feigning death. They are usually present in the largest numbers on the smaller leaved varieties of cottonwoods, and are always more numerous on the lee side of the tree than on the exposed. Trees sheltered by houses also suffer more than others.

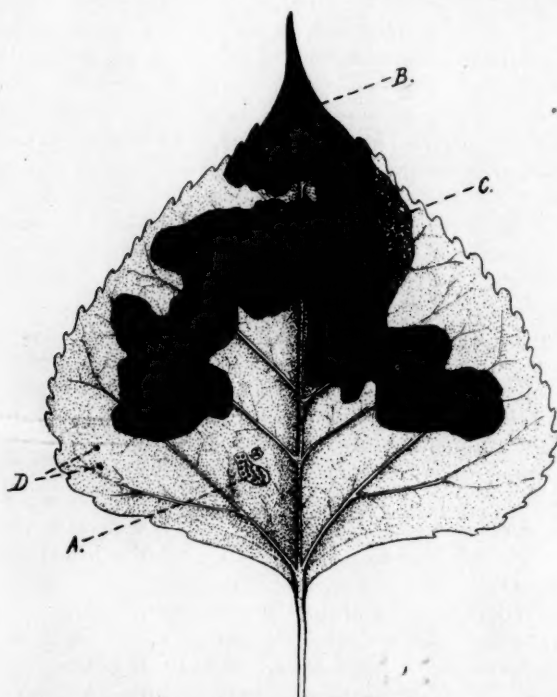


Fig. 1. Cottonwood leaf, upper side, attacked by *Z. scutellaris*, natural size.

- A. Old feeding punctures of adult.
- B. Blackened blister made by larva.
- C. Epidermis torn away where larva escaped.
- D. Darkened areas over eggs which failed to hatch.

By June 26, the sexes are mating freely on the leaves, the female browsing peacefully meanwhile. Before the end of the month numerous eggs can be found in the leaves of trees where the beetles have been feeding. These eggs are yellow or green in colour, elliptical, 1 mm. long by 5 mm wide. They are laid in a small cavity close to the upper epidermis of the leaf. This is connected to a hole on the underside of the leaf by a short diagonal tunnel.

Soon after the egg has been laid the tissues above the cavity turn brown, thus the location of each egg is marked on the upper side of the leaf by a small brown spot about 1 mm in diameter (Fig. 1, D).

From the egg hatches a small, flat larva with a broad head, flattened dorso-

ventrally to such an extent that its anterior margin has a chisel-like edge, from which project a pair of sharp mandibles. (Fig. 4.)

The young larva is very delicate, but it begins at once to enlarge the cavity in which it hatched, feeding only on the palisade cells of the leaf just under the upper epidermis. Throughout its life the larva feeds on these cells only and never attacks the lower layer of cells forming the spongy tissues of the leaf. These latter turn black about 24 hours after the overlying layer of palisade cells have been eaten, and this black colour showing through the transparent upper epidermis causes the unsightly disfigurement of attacked leaves, as shown in Fig. 1, B.

The larva is unable at first to eat through the larger veinlets, but the eggs are always laid within half an inch of the leaf margin, where the veins are very fine, thus assuring an ample food supply before the larva is strong enough to tackle the larger veins, the mid-rib of which will in time be eaten through. Often several eggs are laid in one leaf, in one case as many as 13 were counted, but a large percentage fail to hatch. The larvæ are by no means gregarious.

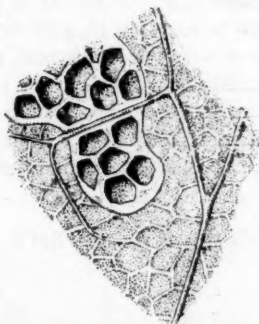


Fig. 2. Old feeding punctures on under side of leaf showing corky tissues developed around punctured area.



Fig. 3. Adult of *Z. scutellaris*, x 7.

When the burrows of two larvæ of approximately equal size join up, these two larvæ may both live if they remain in different areas of the single blister thus formed, but in nearly every case only one survives. A large blister covering almost an entire leaf frequently contains one healthy larva only, together with six or seven smaller dead specimens which show no apparent cause for death.

The larvæ are found with the ventral side uppermost. They are legless, and can move as readily on the dorsum as on the venter. While in the blister they are very active and can move rapidly, but when removed from it their progress is very slow.

In figure 4 we illustrate a larva of this species in the penultimate stage. The characteristic black markings on the meso- and meta-thoracic and on the abdominal segments are present in all stages of this larva, with the exception of the first and the final stages. They occur both on the dorsum and venter.

By the middle of September the majority of larvæ are mature, measuring 6 mm long. They now break through the thin upper epidermis of the leaf (Fig. 1 C) and fall to the ground.

In captivity the escaped larva burrows into the soil to the depth of about 4

inches, where it forms a small elliptical cavity about $\frac{1}{16}$ " long by $\frac{1}{2}$ " wide, in which it is found curled up, probably to hibernate as a larva. These cells with their contained larvæ could not be found under infested trees, the majority of which were growing on lawns. Captive specimens were alive and active when distributed on the 12th of November, but were all dead when examined in the following spring.

Life-history and Habits of *Z. abnormis* Lec.

As previously stated, this is found most abundantly on Balm of Gilead.

Its life-history does not differ much from that given above, though eggs are laid in much larger numbers on individual leaves, as many as 50 having been taken from one leaf. About 28% of the eggs under observation failed to hatch for no apparent reason, and an examination of leaves under natural conditions indicated that this sterility was normal.

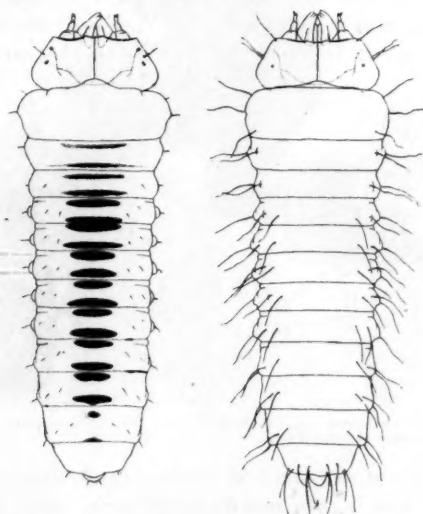


Fig. 4. Larvæ of *Z. scutellaris* and *Z. abnormis*, x 10.

The larvæ are similar to those of *scutellaris*. The main structural differences as shown in Fig. 4, which represents an almost mature larva of each species. Stage II larvæ of *abnormis* have black abdominal markings similar to, though less prominent than, those of *scutellaris*, but from stage III onwards they are entirely missing, and the larva is of a uniform yellowish-green colour.

These larvæ are more gregarious than are those of *scutellaris*, and as many as seven healthy specimens in various stages have been found feeding together in one blister.

The adults attack sheltered trees almost exclusively. The greatest damage is done to foliage 6 to 10 feet from the ground, while the leaves towards the centre of the tree are almost immune from attack.

Though this beetle does not occur annually in such large numbers as does *scutellaris*, it is far more abundant in some years on the comparatively few

Balms of Gilead than is that species. Attacked trees may have the majority of leaves almost completely veined by the feeding of the adults alone.

Control.

Natural.—Egg parasites are numerous, particularly in *Z. abnormis*. A minute Hymenopterous fly was reared from attacked eggs, which has been determined as a Mymarid. Over 40 per cent. of the eggs of *abnormis* examined contained various stages of this parasite.

One specimen of a hymenopterous parasite only was found in large numbers of larvæ examined.

Artificial.—Experiments in spraying infested trees with Lead Arsenate or Paris Green indicated that the latter would prove more successful. It is a more rapid killer, thus reducing oviposition by the females after feeding on it.

The following spray gave good results; Paris green, 1 oz.; slack lime, 4 oz.; water, 10 gallons. Care must be taken that the spray is directed to the underside of the leaves, which necessitates the use of an angle nozzle, and the work must be done as soon as the beetles appear in sufficient numbers to indicate that the trees will suffer later in the season.

It is useless to spray with Paris green when the leaves begin to turn black. The spraying of only a few trees, however well done, in a badly infested area can at best diminish by a small amount the attack on those particular trees. This is due to the flying ability of the beetles. Were the majority of the trees in the district sprayed early in the season most of the beetles would be poisoned while they were feeding on various trees before selecting leaves for oviposition towards the end of June.

THREE NEW CRANE-FLIES FROM EASTERN CANADA.

BY DR. W. G. DIETZ,
Hazleton, Pa.

Late in the fall of 1917, I received from Dr. A. G. Huntsman, Curator of the Atlantic Biological Station, St. Andrews, N.B., a small collection of crane-flies, taken by him at Eastern Harbour, Cape Breton Island, N.S., and Amherst Island, Magdalen Islands, Que. Aside from the three species here described as new, the following species were represented:—*Limnophila inornata* O. S., Eastern Harbour, July 1st, 7 ♂'s; *Limnophila adusta* O. S., Eastern Harbour, July 4, 1 ♀; *Pachyrina pedunculata* Loew, Eastern Harbour, July 1st, 1 ♂; *Pachyrina ferruginea* Fabr., Amherst Is., July 15; Eastern Harbour, July 20, 5 ♂'s, 2 ♀'s; *Tipula angulata* Loew, Eastern Harbour, July 1st, 1 ♂, 2 ♀'s; *Tipula trivittata* Say, Amherst Is., July 15, 1 ♂; *Tipula caloptera* Loew, Eastern Harbour, July 1st, 1 ♀; *Tipula latipennis* Loew (*ottawaensis* Dietz), Amherst Is., July 15, 1 ♂; *Tipula rohweri* Doane, Amherst Is., July 12, 1 ♂; *Tipula inermis* Doane, Amherst Is., July 15, 2 ♂; and *Tipula tephrocephala* Loew, Eastern Harbour, July 1st, 1 ♂, 2 ♀'s.

Limnophila magdalena, n. sp.*

Black with a grayish bloom. Very similar to *Limnophila barberi* Alex. Legs dusky yellow, femora infuscate at apex only.

*Types of the new species are in the author's collection.

Male.—Length 10 mm.; wing 10 mm. Head, mouth-parts, palpi and antennæ black; rostrum short; antennæ short, first joint long with grayish bloom above, second joint broadly subconic, joints three to five a little wider than the following joints and, like the latter, moniliform, outer joints somewhat elongate; the whole antennæ thinly clothed with short, black hairs, shorter than the respective joints. Front and occiput with a grayish bloom and, especially the latter, beset with black hairs. Neck three-quarters the length of front and occiput, transversely subrugulose.

Thorax concolorous, subglabrous; the usual stripes are subfoveate, the median stripe of equal width with an irregular, grayish median line; the interspaces with grayish bloom and a row of short, grayish hairs, directed outwardly; the grayish bloom is more dense on the posterior portion of the præscutum, so as to obscure the limitations of the stripes. Scutum, scutellum and postnotum with grayish bloom. Pleura with grayish bloom, dorso-pleural membrane obscurely yellowish. Halteres entirely pale, yellowish. Legs of moderate length and robustness, sordid yellow with black pilosity; coxæ yellowish-brown, darker anteriorly; anterior and middle femora infusate in apical fifth the posterior in the apical fourth; apices of tibiæ and outer tarsal joints infusate. Wings light brownish, costal portion more yellowish; veins brown, cord and vein *Cu*, *Cu*₂ and *A*₁ seamed with brown; *Sc*₂ on a line with the base of cell *R*₂; *R*₂; *R*₅ long, slightly curved at its base, *R*₂₊₃ very short, scarcely longer than *Sc*₂, cross-vein *r* at the tip of *R*₁; the bases of cells *R*₂₊₃ and *R*₄₊₅ approximately in a line, cell *M*₁ about as long as its petiole; basal deflection of *Cu*, near the middle of cell 1st *M*₂; stigma elongate, quadrate, dark brown.

Abdomen dark brown; tergites two to four, somewhat reddish in the middle portion and thinly clothed with whitish hair. Hypopygium concolorous; the ninth tergite strongly narrowed posteriorly with a small, rounded median emargination. Pleurites large, hairy; the upper appendages dark testaceous, broadening for three-fifths their length, thence narrowed and ending in a dentiform point, the inner margin of the outer two-fifths strongly denticulate; the lower appendage broad in basal portion, and ending in a sharp point.

Holotype.—♂, Amherst Island, Magdalen Islands, Quebec, July 15th, 1917. (A. G. Huntsman).

Distinguished from *L. barberi*, which appears to be its nearest ally, by its larger size, brownish wings, dark brown stigma and veins *Cu* and *Cu*₂ strongly seamed with fuscous. The front femora are reddish-yellow, with only the apex infuscated.

***Limnophila adjuncta*, n. sp.**

Adusta group. Dark brown, thorax shining; costal cells fuscous; stigma dark brown; apical part of wing infusate; veins *Cu* and *Cu*₂ seamed with fuscous.

Length female 9.5 mm.; wing 10 mm.

Head dark fuscous, silvery-gray above; proboscis short, grayish above. Palpi brown. Antennæ short, first joint short, fuscous, joints two to five brownish-yellow, ovoidal, outer joints attenuated, brownish; pilosity of moderate length. A patch of black hair each side of occiput.

Thorax brown, shining; sides and perisutural foveæ grayish-yellow, pollinose. Scutum more distinctly pollinose. Scutellum reddish brown, shining.

Postnotum subopaque, pollinose. Pleura reddish brown, subglabrous with a faint, grayish sheen. Halteres pale, club infusate. Legs slender, sordid yellowish brown; pilosity short, grayish; coxæ and basal part of femora yellowish, tarsi fuscous. Wings light gray, costal cells fuscous, stigma elongate, dark brown, apical portion of wing infusate, veins *Cu* and *Cu*₂ seamed with fuscous. Venation as in *Limnophila terræ-novæ*** Alex.

Abdomen yellowish brown, with a fine, pale pubescence; venter yellowish. Ovipositor brown, valves slender, curved upwards, apices pale.

Holotype.—♀, Eastern Harbour, Cape Breton Islands, July 17th, 1917. (A. G. Huntsman).

A very close ally of *L. terræ-novæ*, with the description of which it agrees in all points, save that the cord and cross-veins are not seamed with fuscous; the *Rs* is longer than cell 1st *M*₂—equal in *terræ-novæ*—and subangulate at the base, with a short stump of a vein. Cell *R*₂ is very narrow in its basal half, whereas it widens from the base in *terræ-novæ*.

Tipula huntsmaniana, n. sp.

Very similar to *Tipula angulata* Loew. Flagellar joints of antennæ bicoloured. The pale, angulate fascia incomplete, scarcely reaching the middle of cell *M*₃; base of wing yellowish.

Male.—Length 13 mm.; wing 13.5 mm.

Head dull yellow; palpi yellowish brown, last joint dark brown and shorter than the preceding joints together. Frontal prolongation and rostrum concolorous, with a light, whitish pollinosity. Nasus short. Antennæ of moderate length, the three basal joints yellowish, joints three to ten yellowish, blackish at the base, outer joints brown. Frontal tubercle with impressed longitudinal line. Occiput with pale, yellowish-gray hairs.

Thorax yellowish gray, dull. Pronotum with dark, median spot. Præscutal stripes darker brown, ill defined; the median stripe narrowed posteriorly with a not sharply limited, median paler line, scutum dull brown, posterior border paler; scutellum and postnotum luteous, with ill-defined, median darker line. Pleura yellowish white, subsericeous; pleuro-dorsal membrane dull yellow. Halteres pale, club dark brown. Legs slender, dull, yellow; pilosity very short, blackish; coxæ yellowish white, sericeous; femora and tibiæ infusate at the tip, the latter a trifle longer than the metatarsus; tarsi fuscous. Wings with the pattern of *T. angulata*, but the pale, angulate fascia becomes narrowed in cell *M*₂ and does not extend beyond the middle of the latter cell.

Basal tergites of abdomen yellowish, becoming yellowish brown to fuscous posteriorly, with darker, median vitta; lateral margin of tergites paler. Venter similar to tergum. Eighth sternite rounded. Hypopygium yellowish brown; ninth tergite subquadrate with U-shaped median emargination, the lateral margin of the latter ends in a sharp point. Pleural suture entire; the pleurite transversely oval, the outer appendage narrow, erect, pointed, curved somewhat backward, hairy; the inner appendages consist of perpendicular plates, broadly rounded basally, narrowed upwardly and ending just below the free margin of the ninth tergite; ninth sternite with a deep, U-shaped emargination.

**Journal New York Entomological Society, vol XXIV, Pl. 8, fig. 7.

Holotype.—♂, Eastern Harbour, Cape Breton Island, N.S., Canada. (A. G. Huntsman).

A close ally also of *Tipula entomophthorae*¹ Alex., which it resembles in hypopygial structures and from which it is differentiated in the bicolored, flagellar segments and the ill-defined, thoracic stripes. It differs from *Tipula angulata* Loew and *Tipula huron* Alex.², in the angulate fascia not rendering the posterior wing-margin. *Tipula texensis* Alex.³, has the pale fascia before the stigma.

Respectfully dedicated to Dr. A. G. Huntsman.

A NEW USE FOR THE AEROPLANE.

The Department of Agriculture at Ottawa has discovered a new use for the aeroplane. The Entomological Branch is investigating the mosquito in the Lower Fraser Valley in British Columbia. By using the aeroplane, the country can be surveyed in order to map out the swampy areas and other breeding places that are readily located in photographs taken from over head, according to a statement by Dr. C. Gordon Hewitt, Dominion Entomologist, that appears in the October Agricultural Gazette. The aeroplane was used in making a comprehensive survey of the complicated water system of the Fraser River and the adjacent bodies of permanent and temporary water in that district. A flight reported by Dr. Hewitt has demonstrated the possibility of using this machine also for making surveys of timber that is being killed or has already been destroyed by various insects. Its use, it is believed, will help very greatly in the entomological work with various insects being carried on by the Federal Department of Agriculture.

THE HOUSE CENTIPEDE, CERMATIA FORCEPS RAF. IN MONTREAL.

A specimen of this Myriapod was found in a classroom of Goltman's Business College on St. Lawrence Boulevard (corner of Sherbrooke Street) on July 22, 1919, and was sent by Mr. Robert Goltman to me for the Redpath Museum where it was seen by Mr. A. F. Winn. It was kept alive feeding slightly upon house-flies until August 19th, when, by an unfortunate accident, it escaped. The species is mentioned in Comstock's Manual (p. 46) as "often found running on the walls of houses, especially in the Southern States." It was observed in Albany from 1870 onwards by J. A. Lintner, but this is believed to be the first record of its occurrence in Montreal. Lintner's account of its cleaning habits was confirmed; when cleaning the hinder limbs the body is bent sideways. The appendages of one side are cleaned in succession, beginning with the antenna.

The occurrence of this Myriapod in Canada has been recorded only once previously, a specimen having been taken in Toronto. (Can. Ent., XLVI, p. 219, 1914.)

ARTHUR WILLEY.

Two other specimens of the house centipede from Toronto have been sent me to for determination since the record cited by Prof. Willey was published.

E.M.W.

1. Can. Ent., Vol. L, p. 385.

2. Ibid, Vol. L, p., 66.

3. Ibid, Vol. XLVIII, p. 48.

THE BEE GENUS EMPHOR IN SOUTH AMERICA.

BY C. SCHROTTKY,
Pto. Bertoni, Paraguay.

Mr. J. Vachal (Rev. Ent. Caen., Vol. XXVIII, p. 23, 24) cites 3 species of *Emphor* from Argentina: 1, *E. fructifer* (Holmbg.); 2, *E. tricolor* (Friese), and 3, *E. bifax* Vach. The first is at the same time the type of the genus *Teleutemnesta* Holmbg., and the second was described as an *Ancyloscelis*. Vachal himself regards *Emphor* as a subgenus of *Ancyloscelis*; but this standpoint is not to be discussed here. Changing his term "subgenus" into "genus," the question is left open whether he was correct in synonymizing *Teleutemnesta* with *Emphor*, or not. As I had the occasion to see some specimens of a representative of this group in the collection of Mr. A. de Winkelried, Bertoni, I think it useful to give a detailed description of them as well as some remarks on the group as a whole. For, if Mr. Vachal's views are correct, the genus would have a singular distribution; a few species in Argentina and one in the Eastern United States. The specimens mentioned above came from Santa Fé, Argentina, and cannot be referred to any of the three species cited by Vachal. There is a description of *Ptilothrix tricolor* (Friese) given by Brèthes* (Anal. Mus. Buenos Aires, Vol. XX, pl. 10, p. 295), based apparently on the same insect as the Santa Fé bees, but, as it seems, not on that described by Friese as *Ancyloscelis tricolor*. There are too many differences between the description of the latter and the Santa Fé bees, so these are treated here as a new species: *Emphor opuntiae*. Surely they are at least congeneric and with the same habits as *tricolor*. Mr. A. C. Jensen Haarup states that *tricolor* "is rarer than the preceding"—*Ancyloscelis nigerrima*—"and similarly a cactus-insect" (Flora og Fauna, 1908, p. 103). According to Mr. Joergensen who observed both *tricolor* and *nigerrima* at Mendoza, Argentina, they are one and the same species; the few red hairs on the segments of *tricolor* are soon lost or decoloured and thus the insect becomes *nigerrima*. There are no plastic differences between them (Zool. Jahrb., Vol. XXIX, 1912, Abt. f. Syst. p. 157).

Joergensen says that the bee provides its nest with a tube above the soil, a behaviour not observed of any other bee from Mendoza. Among the flowers visited he likewise cites an *Opuntia* (l. c.). The North-American species, *E. bombiformis* (Cress.), on the contrary, was found on flowers of *Ipomæa* and *Hibiscus*, as far as I know.

The species described by E. L. Holmberg as *Teleutemnesta fructifera* is surely also congeneric, although there seem to exist slight differences in the venation of the wings. Holmberg says that the second cubital cell is smaller than the first or third, with the first recurrent nervure a trifle behind its middle. Vachal states that the second cubital cell is almost as large as the first or third, with the first recurrent nervure between its middle and apex, nearer to its middle, however. In *opuntiae* the second cubital cell is scarcely half the length of the first and not more than $\frac{3}{4}$ of the third; the first recurrent nervure enters in the female almost in the middle of the cell, in the male between middle and apex. In *bombiformis* finally, the second cubital cell is described as about $\frac{3}{4}$ the length

*Brèthes considers *Emphor* and part of *Teleutemnesta* as synonyms of *Ptilothrix* Sm. (Bull. Soc. Ent. France, 1910, p. 212). They are certainly related but not identical if the figures given by F. Smith are correct.

of the first. In *opuntia* the claws have a short median tooth in the female, a long one in the male, thus in the latter sex they appear almost cleft. In both sexes there are no pulvilli; of the other Argentine species no references are given in this respect.

***Emphor opuntia*, n. sp.**

Female.—Black, 13 mm. Head as broad as thorax. Face clothed with dirty white pubescence, that on vertex black. Clypeus nude, convex, its anterior margin slightly depressed, covered not very closely with rather large punctures; its hinder margins oblique and clothed with whitish pubescence. Mandibles with fine yellowish pile at base, reaching the eyes. Vertex quite closely punctured with rather small punctures. Antennae short, black; scape minutely punctured.

Thorax covered with grayish hairs; a transverse line of fuscous hairs behind the anterior margin of the mesonotum, with short triangular projections backwards on the parapsidal region; another transverse band of fuscous hairs on the anterior margin of scutellum. Tubercles with fuscous hairs. Sternum and lower part of pleurae densely covered with short black hairs. Mesonotum and scutellum with quite large punctures. Basal area of propodeum almost bare, covered with fine shallow punctures and with a slight median depression at base. Enclosure of basal area smooth and shining, the rest of propodeum densely punctured. Pleurae equally covered with close punctures.

Abdomen.—First two dorsal segments covered with very short white hairs, becoming closer and longer at sides and on apical margins, forming fasciae which become gradually broader towards the sides; that on second segment is white only in the middle, towards the sides it becomes more and more yellowish. The following two segments are clothed at base with short scattered black hairs. the marginal fasciae are formed by longer and closer hairs, orange-yellow and broader at sides, paler and narrower in the middle. Fifth segment only at sides with orange-yellow hairs, those at base and on apical margin fuscous. Sixth segment entirely covered with fuscous hairs, except the naked pygidial plate; this opaque, tapering towards apex, longer than broad at base. All segments punctured; the punctures small and scattered at basal segments, become gradually closer and larger towards apex. Ventral segments 2-5 with fringes of long, orange-yellow hairs; the hairs on second segment scattered, on fifth very close. Punctures on ventral segments closer at apical margins than at base.

Wings.—Subhyaline, nervures dark brown, stigma same. First cubital cell longer than third; second pentagonal, narrowed above, scarcely half the surface of first and about $\frac{2}{3}$ of third, with the first recurrent nervure a little behind its middle. Origin of cubital nervure and of first recurrent nervure equally distant from base of wing. Tegulae almost black, microscopically punctured.

Legs.—Clothed with long, fuscous hairs. Femora dark reddish brown. Tibiae almost black; tarsi ferrugineous. Tibial spurs reddish brown, those on posterior pair hooked at apex. Claws slender with an acute median tooth. No pulvilli.

Male.—General appearance similar to female, but larger (14 mm.), on abdomen and legs less densely haired.

Head.—Clothed with long grayish white pubescence; no dark hairs on vertex. Punctures on clypeus much closer than in female. Labrum very large, closely punctured, its apical margin incrassate, smooth and shining, clothed with a few yellowish hairs. Antennæ short; second joint of flagellum longer than third and fourth united; last joint a little compressed.

Thorax.—Entirely covered with dirty white pubescence, even the sternum, only on scutellum the hairs are brownish. Propodeum with longer and denser hairs as in female, the basal area concealed under the long pubescence.

Abdomen.—As in female, but the hairs on sides and apical margins much shorter, hence the fasciæ narrower and weaker, especially when seen from behind; fifth and sixth segments with orange-yellow fasciæ, and undefined patches at sides basally formed by fuscous hairs; seventh segment with dense fuscous hairs.

Wings.—The origin of the cubital nervure a trifle nearer to base of wing than that of first recurrent nervure; this entering second cubital cell between middle and apex, closer to its middle.

Legs.—Stouter than in female, less hairy, the hairs pale. Hind coxæ very thick, almost without punctures, but clothed with fine, long, yellowish hairs. Claws with the median tooth longer than in female, almost reaching tip of claws.

Argentina; Santa Fé.

Female.—(Type) Dec. 30, 1910, on *Opuntia monacantha* Haw.

Male.—(Genotype). Same locality, without other date.

From *Teleutemnesta* s. *Emphor fructifer* (only the female is described by Holmberg) it differs by the mandibles not spotted with yellow; by the pubescence of thorax which is gray mixed with a few fuscous hairs in *fructifer*. The punctures on thorax of *opuntia* are neither very fine nor very close as in Holmberg's species. The scopa is fuscous in *opuntia*, fulvous in *fructifer*; the latter has the four basal segments of abdomen fringed with orange-yellow fasciæ.

The males described by Vachal as *fructifer* are perhaps another species as they are unusually small (10–11 mm.), while in the other known species the male is equal in size to female or even larger. From these so-called *fructifer* the new species differs by the tubercles being clothed with pale hairs as well as the anterior pair of legs and the femora of the remaining. All these are clothed with black hairs in Vachal's specimens.

E. tricolor (Fries) female has no transverse fasciæ of dark hairs on mesonotum and scutellum, but many gray hairs which replace sometimes all the black pubescence; the abdominal segments 2 and 3 have whitish fasciæ, and only the sides of third and fourth segments have yellowish fasciæ. Moreover, it is smaller (12 mm. long, 4 mm. late), against 13 and 4.5 mm. in *opuntia*.

The male of *E. tricolor* is smaller and has yellowish hairs only at sides of abdominal segments 3 and 4. The description given by Fries is very incomplete and not fit for comparison.

E. bifax Vach., judging from the very short description, is quite another insect.

Ptilothrix megasoma Brèthes seems to belong to *Emphor* too; it is a large bee (15 mm.) from Mendoza, and differs considerably from *opuntia*.

NOTES ON SCUTELLEROIDEA FROM VANCOUVER ISLAND.

BY DAYTON STONER,
Iowa City, Iowa.

During the latter part of the summer of 1913 the writer and Mrs. Stoner spent a few weeks at the Dominion Pacific Coast Biological Station, which is located on Departure Bay some three miles north of the city of Nanaimo on Vancouver Island. The principal object of the trip was to collect and investigate the marine fauna of the region and, due to the kindness of Dr. C. M. Fraser, Director of the Station, this phase of our work was exceedingly profitable. During our stay a few short excursions were made for the purpose of collecting insects. Only general collecting was attempted, and as a result the number of Scutelleroidea taken was not large.

Practically all the collecting was done within a radius of three miles of the Station, which is surrounded on the landward side by a dense growth of lofty coniferous trees. Here and there are more or less open places where the sun penetrates and where blue grass, timothy and clover grow to some extent. Further inland are pastures and open cultivated areas with an occasional marsh or lake.

The purpose of this brief article is simply to make available definite locality records for the species taken.

LIST OF SPECIES.

Family SCUTELLERIDÆ.

Homaemus aeneifrons (Say).

Not a common form in the region, less than a half dozen specimens having been taken on August 26 and September 4.

Eurygaster alternatus (Say).

This seemed to be the commonest scutellerid of the region, and it was found on the high grass around the edges of pastures, August 25 and 26.

Family PENTATOMIDÆ.

Peribalus limbolarius (Stal).

But two specimens of this form were taken on August 26 and September 1.

Chlorochroa uhleri (Stal).

One of the most abundant species of the region. Adults, and nymphs in third and fourth instars were taken between August 25 and September 12. Toward the middle of September these bugs often congregated in numbers upon the blossoms of spiræa (*Spiræa* sp.), and on one occasion twelve individuals were photographed on a single blossom of this plant.

Euschistus euschistoides (Voll.)

Numerous examples were taken between August 28 and September 6 in pastures and from partly-cleared areas in the woods where a little blue grass and clover were making an attempt to gain a foothold.

Euschistus conspersus (Uhler)

A long series of specimens is at hand bearing inclusive dates from August 24 to September 12. This form was common on the long grass in pastures where cattle were feeding and in the high grass around the borders of such fields. The species was also taken on Gabriola Island. This rocky island lies in the Strait of Georgia several miles south of Departure Bay; it is about ten miles in

length, very narrow, and a good deal of its area is covered by pine and eucalyptus trees. Not many insects were taken on the island. This pentatomid was also taken on Brandon Island, a very small rocky island in Departure Bay, and perhaps a hundred yards from the Station. Only a very limited amount of vegetation is supported by the soil, and at high tide the island is pretty well covered by water. The bugs probably do not breed upon these small, rocky islands, of which there are a great many in the region, but are probably blown out or fly out from the main land.

***Cosmopepla conspicularis* (Dall)**

Several specimens of this species were usually taken on each collecting trip. They were found more commonly in semi-cultivated areas. All the specimens are uniformly marked so far as colour pattern is concerned, but the transverse band across the pronotum varies in intensity from pale yellowish white in some specimens to deep reddish orange in others.

***Eysarcoris intergressus* (Uhler).**

But a single specimen of this species, a female taken September 1, is represented in our material. This specimen is a little darker and has a more bronzed appearance than the other specimens in my collection, which are from Colorado and Washington. I believe that the species has not before been recorded from the latter State.

***Thyanta custator* (Fabr.).**

This was the most abundant pentatomid of the region, and was taken on every collecting excursion between August 26 and September 12. Both pale yellowish and the typical greenish individuals are among the lot, but in none is the sanguineous band across the pronotum well marked, although it is evident in some of the pale forms. This bug was common in open places in the woods near the Station where a little clover and timothy were growing. Two specimens were also taken on Brandon Island September 1.

***Banasa dimidiata* (Say).**

Seven specimens of this species were taken by us between September 1 and 6. All have the general body colour, a reddish brown with the anterior half the pronotum yellowish green. In none of the examples is the second segment of the antennæ more than one-half the length of the third.

***Elasmotethus cruciatus* (Say).**

But one specimen of this species, a typically coloured female was taken on September 1.

***Podisus serieventris* (Uhler).**

One adult female, taken September 1 and a nymph in the fourth instar constitute our only records for the species. The adult example is dark reddish in colour with the tips of the humeri and a spot on each hemelytron black.

A CORRECTION.

In my article entitled "Notes on Thysanoptera from British Columbia," issued in the Canadian Entomologist, Vol. LI, pages 181-190; on page 182 line 28 Plate XVI, fig. 1 should read Plate XVI, fig. 2, and on page 184, line 24 Plate XVI, fig. 2 should read Plate XVI, fig. 1.

R. C. TREHERNE,

Entomological Branch, Dominion Department of Agriculture.

NOTES ON ISCHYRUS QUADRIPUNCTATUS OLIV., BRED FROM FUNGUS.

BY HARRY B. WEISS,
New Brunswick, N.J.

On July 10 at Union (near Elizabeth), N.J., several partly grown larvæ and adults of this species were taken while feeding on a species of *Poria* growing on an old elm stump. Most of the larvæ were feeding openly on the surface of the fungus, while others were partly buried in it. Some of the larvæ were caged together with a supply of food, and these continued to feed up until July 16, by which time all of the fungus had been eaten. They then burrowed into the old, decayed bark and constructed cells in which they pupated. By July 20 all had transformed into pupæ, and on July 27 the first adult emerged, fully coloured.

According to Stevens,¹ members of the fungus genus *Poria* may be recognized by the sporophore being entirely resupinate, often widely extended, the base leathery to punky and the pores small and rounded covering almost the entire surface.

Full grown Larva.—Length 9 mm. Width across mesothorax 2.5 mm. Elongate, subcylindrical, abdomen tapering slightly toward anal segment, segmentation distinct; antennæ three-jointed, subcylindrical, second joint longest and bearing minute third joint, which is tipped with a hair; prothorax twice as long as mesothorax; meso- and metathorax subequal in length; abdominal segments subequal in length. Colour white except for head which is dark and the dark brown to black, subrectangular, transverse, chitinized areas on the dorsal surfaces of the thoracic and abdominal segments, giving the dorsal surface a transverse banded appearance. Median, V-shaped, white line on head with point of V touching anterior, prothoracic edge; median, white, dorsal line on thoracic and abdominal segments; on either side of the median, dorsal line on prothorax is a wider, somewhat curved, white line, which taken with median line divides the dark area into four parts, the lateral parts being subcircular; dark areas on dorsal surfaces of head, thorax and abdomen bear numerous white hairs with prominent, tuberculate, dark bases becoming largest on the last five or six abdominal segments; dorsal surface of last abdominal segment bears two prominent, spine-like tubercles curved anteriorly, these tubercles bear smaller tubercles each tipped with a white hair; lateral surfaces of thoracic and abdominal segments bear several hairs with tuberculate bases; tubercles on lateral portion of head posterior to antennæ are the largest; ventral surface and legs white and sparsely hairy; spiracles on second thoracic and abdominal segments one to eight.

Pupa.—Length 8.5 mm. Width across thorax 3.2 mm. White, elongate-oval, rounded anteriorly, gradually tapering posteriorly; head, thorax and wing-cases, especially prothorax, covered with minute, reddish-brown tubercles each bearing a long, white, spine-like hair; transverse patches of similar tubercles on dorsal and ventral abdominal segments, more numerous on dorsal surface; lateral surface of each abdominal segment bears two groups of slightly longer tubercles each bearing a long hair; lateral spine-like hairs are longer than other

1. Stevens, F. L., The Fungi Which Cause Plant Disease, 1913.
January, 1920

body hairs; anterior, median, dorsal surface of prothorax bears a pair of prominent tubercles, each tubercle bearing two reddish-brown, prominent, posteriorly directed, curved spines (giving an antler-like effect); posterior, median, dorsal surface of prothorax bears a pair of smaller tubercles each with two posteriorly directed spines, the anterior spines being strongly curved; mesothorax bears a pair of median tubercles each with a large, posteriorly directed spine and a smaller, perpendicular one anterior to it; metathorax bears pair of tubercles each with a posteriorly directed spine; bases of thoracic tubercles all bear smaller, reddish-brown tubercles, those on meso- and metathorax being arranged in a circle; median, dorsal portions of abdominal segments one to eight bear eight, large spines with tuberculate bases, arranged in a double row of four each, the anterior four usually being anteriorly directed and the posterior four being posteriorly directed; on last three abdominal segments these spines become closer together and appear to radiate somewhat; last abdominal segment bears a dorsal pair of prominent, anteriorly directed, curved, chitinous spines; all spines reddish brown; fewer tuberculate, spine-like hairs on ventral surface.

Adult.—*Ischyrys quadripunctatus*. This was described by Olivier in 1808 (Enc. Meth. Ins. VI, 437). Blatchley² states that it is frequent throughout Indiana, Jan. 21–Dec. 8, being gregarious in winter and hibernating beneath bark and logs, also it is often found at sap in early spring and on fungi in the summer. Smith³ records it only from Caldwell and Westville in New Jersey, but it occurs in various other places in the state. Chagnon⁴ lists it from Quebec, Canada. Beutenmuller in his "Bibliographical Catalogue of the Described Transformations of North American Coleoptera"⁵ gives the following single reference to the larva, "1855, Larva (Fig.) Chapuis et Candeze. Mem. Soc. Sc. Liege VIII, 22 pl.

NOTE ON THE DISTRIBUTION OF *ATTEVA AUREA* FITCH.

BY FRANK M. GIBSON, PH. D.,
Baltimore, Md.

This moth was first described by Asa Fitch in his Third Report on the noxious, beneficial and other insects of the State of New York, but he does not report its occurrence in that State, having prepared his description from a specimen sent him from Savannah, Georgia. Dyar gives its habitat as the Southern States; Holland as the southern portion of the region covered by his *Moth Book*, from the Gulf States southward and westward, into Mexico and lands still further south.

In July of the present year, I found in this city, feeding upon ailanthus, certain larvæ which were unknown to me. They pupated while suspended in a loose, irregular net spun among the leaves, and emerged July 25–28. I sent one of these to Dr. Barnes, who kindly confirmed my identification of it, and stated that he had raised the moth at Decatur, Illinois, on ailanthus, and that Mr. Poling had bred it at Quincy in the same State. This would indicate a far wider distribution for it than that assigned by Holland and Dyar.

2. Blatchley, W. S., *Coleoptera of Indiana*, p. 546.

3. Smith, J. B., *Insects of N. J.* (N. J. St. Mus. Rept., 1909).

4. Chagnon, G., *Coleoptera of Quebec*.

5. Jour. N. Y. Micros. Soc., Vol. VII, No. 1, 1891.
January, 1920

THE ENOMOLOGICAL SOCIETY OF AMERICA, ANNUAL MEETING.

The Fourteenth Annual Meeting of the Entomological Society of America was held at St. Louis, Mo., on December 29 and 30, 1919. The chair was occupied by the President, Professor J. G. Needham, and there was a goodly attendance of members present.

The following is a list of the papers read at the meeting:—

TROPISMS IN INSECT BEHAVIOUR—AN ENQUIRY. C. H. Turner.

THE FOOD PLANTS AND DISTRIBUTION OF CERTAIN CALENDRA SPECIES. A. F. Satterthwaite.

THE BIOLOGY OF THE CARABID GENERA BRACHYNUS, GALERITA AND CHLAENIUS. J. L. King.

THE INFLUENCE OF ENVIRONMENTAL FACTORS IN THE HATCHING OF THE EGGS OF APHIS PRUNIFOLIA, FITCH. Alvah Peterson.

INSECTS OF THE BETWEEN-TIDE ZONE OF THE NORTH CAROLINA COAST. Z. P. Metcalf and Herbert Osborn.

OBSERVATIONS ON CANADIAN TICKS. Seymour Hadwen.

NOTES ON THE MOUTH-PARTS OF ARADIDÆ. C. S. Spooner.

THE GENITALIA OF THE SYRPHIDÆ. C. L. Metcalf.

OBSERVATIONS ON THE GENITALIA OF LACHNOSTERNA. Wm. P. Hays and J. W. McCulloch.

NOTES ON THE LEAFHOPPERS OF THE SUBFAMILY GYPONINÆ. E. D. Ball.

THE PRODUCTION OF ABNORMAL LARVÆ, PUPÆ AND ADULT BEETLES BY GAS SECRETED BY THE CONFUSED FLOUR BEETLE (*Tribolium confusum*). R. N. Chapman.

SERUM DIAGNOSIS AND INSECT RELATIONSHIP. Robt. D. Glasgow and Josephine Burns Glasgow.

THE SYRPHID FLY (*Mesogramma marginatum*) CAUGHT BY FLOWERS OF THE DOGBANE. R. C. Osburn.

A special feature of the meeting was a symposium on "The Life Cycle of Insects," which aimed to give a "bird's-eye view" of the entire subject. The scope attempted was as follows: 1. Facts as to form changes, broods, length of life, moults. 2. Significance of facts in relation to nature of environment, reproductive capacity, rate and times of growth, habits, etc. Briefest possible statement of what each group best illustrates in relation to the life cycle.

The subject was presented by groups as follows:—Apterygote Insects, J. W. Folsom; Orthopteroids (sens. lat.), E. M. Walker; Hemiptera, (excl 4), E. D. Ball; Aphids and Coccids, Miss Edith M. Patch; Neuropteroids having complete metamorphosis, and Lepidoptera, S. L. Fracker; Coleoptera, (including Strepsiptera), R. N. Chapman; Diptera, C. L. Metcalf; Hymenoptera, T. D. A. Cockerell. Concluding remarks on the general subject were made by Prof. S. A. Forbes.

The Annual Address was delivered on Tuesday evening by Dr. W. J. Holland, Director of the Carnegie Museum, Pittsburgh. His subject was "The Evolution of Entomological Science in North America."

VARIATIONS OF BUPRESTIS VIRIDISUTURALIS, NICOLAY & WEISS.

BY RICHARD T. GARNETT,
Oakland, California.

In my collection, although there are but two perfect specimens of this species, I have the elytra of twenty-nine other specimens. This is a large enough series, I should judge, to give the general trend of markings in this very variable species.

In the plate given by Nicolay and Weiss of this species the male is represented with a thin sutural marking and about two-thirds the distance from the anterior edge a triangular dark marking on the disc extending from the suture as a base. Of the five male elytra that I have, one is like their figure. The other four have only an extremely thin sutural marking with a small humeral spot in one (Fig. 8).

Of the twenty-six female elytra there is but one that I have that approaches exactitude with that of the plate given by Nicolay and Weiss. I have them varying from the nearly all yellow elytra (Fig. 2) to the half dark colouring of (Fig. 10). Figures 4 and 5 show how the sutural markings are connected or tend to become connected (Fig. 4) with the lateral markings. Figure 4 also shows the maximum number of spots present on any one set of elytra in my series.

One thing that I examined especially was the colour; and, as my series for the most part had died some time before collection, I used chloroform and a moistening box to bring back the natural colour

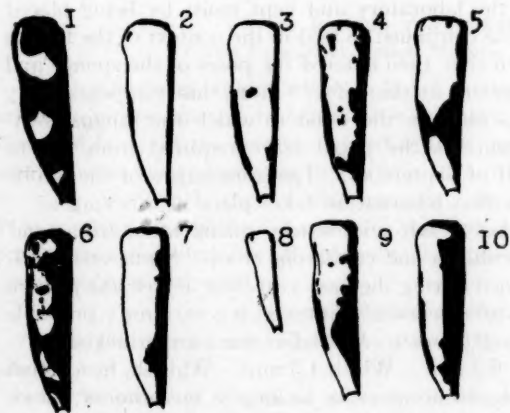


Fig. 5. 1.—Elytron of *B. gibbsii* Lec.; 2, 3, 4, 5, 7, 9, 10.—Elytra of *B. viridisuturalis* Nicolay & Weiss. (Female); 6.—Composite elytron of variations of *B. viridisuturalis* N. & W.; 8.—Elytron of *B. viridisuturalis* N. & W. (Male).

in case the colour present was not the natural one. This failed, however, to bring any results, and as far as I can see the colour of the majority of my *viridisuturalis*, that is, of the dark markings along the suture, is identical with that of the dark markings of *B. gibbsii* Lec., a metallic greenish purple.

Going a little further I took a composite of all the markings found in my series (Fig. 6) to compare it with the markings found in my specimens of *B. gibbsii* (Fig. 1). There are some points of similarity, as can be seen in the humeral lunule and the almost completely divided median spot. Perhaps some day a specimen will be found with similar markings, for if various specimens may have such varied markings it is reasonable to believe that some specimens may have a combination of these markings.

Thus I believe it may be safely stated that while *B. viridisuturalis* is certainly a distinct species it may simulate in markings *B. gibbsii* somewhat, and

also in the colouring, with the exception that there is never orange on the elytra of *B. viridisuturalis* as far as I have observed them. The females of *B. viridisuturalis* are also usually 1 or 2 mm. longer than *B. gibbsii*.

My *B. gibbsii* were taken in Trinity Co., Calif., breeding in oak, (a fallen log), while my specimens of the other were taken from dead wood of a live standing cottonwood at Oro Grande, San Bernardino Co., Calif. *Gibbsii* I believe breeds only in oak (vide Leach & Van Dyke), while Van Dyke says that so far as he knows, *B. viridisuturalis* is confined to the cottonwoods.

NOTES ON MYCOTRETUS PULCHRA, SAY AND ITS FUNGOUS HOST.

BY HARRY B. WEISS,
New Brunswick, N.J.

This member of the family Erotylidae was found breeding in *Polyporus chioneus* at Monmouth Junction, N.J., on September 8. At this time larvæ, pupæ and several adults were present, with the larvæ most plentiful. The infested fungus was moved to the laboratory and kept moist by being placed close to a wet sponge. The larvæ continued to feed in the context of the fungus until they were full grown, when they then entered the pores of the sponge and pupated, the sponge being rather dry at that time. From this it appears likely that pupation in the field takes place in the wood to which the fungus is attached. Under laboratory conditions the pupal stage required from ten to twelve days during the last half of September. The appearance of the adults this late in the season indicates that hibernation takes place in this stage.

Polyporus chioneus Fries¹ has a soft and watery pileus when fresh, and occurs on the dead wood of deciduous and coniferous trees. Numerous specimens of other fungi were examined during the past year, but *Mycotretus pulchra* Say was found associated only with *chioneus*. However, it is extremely probable that other watery forms such as *P. borealis*, *P. albellus*, etc., are attacked.

Full-grown Larva.—Length 6.2 mm. Width 1.5 mm. Whitish, head often slightly browned; subcylindrical, prothorax twice as long as mesothorax; mesothorax and remaining body segments except last two are subequal in length; last two segments shorter; head, prothorax, and last two abdominal segments narrower than remaining segments which are subequal in width (some larvæ have expanded grub like abdomens); body and legs sparsely hairy, hairs short; abdominal spiracles project slightly from the body appearing as minute, somewhat blunt spines.

Pupa.—Length 4.4 mm. Width across wing-cases 1.9 mm. Whitish, suboval, rounded anteriorly, tapering to a point posteriorly; head, prothorax and wing-cases thickly clothed with spines each bearing a long hair; fewer spines on leg-cases and ventral abdominal segments; anterior edge of prothorax bears a pair of median irregularly shaped knob-like tubercles each bearing several spines; smaller, somewhat similar median pairs of tubercles on posterior edges of pro-, meso- and metathorax; each abdominal segment bears a transverse dorsal row of spines with a rosette-like group of five or six at the lateral edge, these rows continued on the ventral surface but with fewer spines; body terminated dorsally by two comparatively long, curved spines and ventrally by

1. Identified by Mr. Erdman West.
January, 1920

two lateral, rosette-like groups of spines; abdominal spines directed posteriorly; all spines bearing long hairs; entire dorsal surface bears smaller spines intermixed with those mentioned above.

Adult.—*Mycotretus pulchra*. This was described by Say in 1826 (Jour. Phil. Acad. Nat. Sci. V, 301; *ibid.* II, 345) under the generic name *Tritoma*. It is about 3 to 3.5 mm., long, ovate, with the head, thorax and scutellum black, the elytra red with the apical third obliquely black, the black extending forward on the sides almost to the humeri. The head and thorax are finely and sparsely punctured, the punctures of elytral striae are fine, the intervals finely punctate.

Smith² records it from Hudson County and Woodside, N.J., with the statement that it was once common. Blatchley³ states that it is frequent in Marion, Vigo, Knox and Posey Counties, Indiana, April 9–June 19, and in Chagnon's Coleoptera of Quebec⁴ it is listed from Rouville Co., June, Montreal Isl., June and Laval Co., August.

A NEW GENUS AND SPECIES OF APHID FROM JAPAN. (HEM.)

BY RYOICHI TAKAHASHI.

Forest Experiment Station, Meguro, Tokyo, Japan.

This interesting aphid, which is found in the leaves of *Podocarpus macrophylla*, is rather inactive in habit. Both winged and wingless forms appear in May and later, in the second and subsequent generations. The sexuparae are wingless, but most interesting is the fact that the oviparous female, as well as the male, is winged, these forms appearing during the month of September. As is common for species belonging to the Siphonophorina, wingless viviparous females may give birth to both winged and wingless progeny, but winged females produce only wingless forms.

Neophyllaphis, new genus.

This genus is closely related to *Phyllaphis* Koch, but differs from it as follows:

1. Sensoria on the third segment very peculiar in shape, being transversely narrow.
2. Body of the wingless form covered with white secretions which are not thready.
3. The oviparous female is winged.

Winged female.—Body rather narrow and without hairs. Frontal tubercles absent. Antennae nearly as long as body, six-segmented, spur of last segment very small, sensoria on third segment transversely narrow (ring-like in the oviparous female). Ocelli prominent. Abdomen without tubercles. Wings hyaline, the third oblique twice branched. Cornicles very small and much wider than long. Cauda not globular, but is constricted at base and slightly so at middle. Anal plate slightly sinuate. Empodial hairs absent.

Wingless female.—Similar to the winged female. Body with a white pulverulence. Eyes very small. Third antennal segment without sensoria.

Type.—*Neophyllaphis podocarpi*, n. sp.

2. Insects of New Jersey (N. J. St. Mus. Rept. 1909).

3. Coleoptera of Indiana, p. 546.

4. Prelim. List Ins. Prov. Quebec, Coleop. (1917, Suppl. Rept. Quebec Soc. Protec. Plants.)

***Neophyllaphis podocarpi*, n. sp.**

Winged viviparous females.—Body rather narrow and without hairs. Frontal tubercles inconspicuous. Beak slender and reaching beyond the hind coxæ. Eyes large, ocelli prominent. Antennæ slender, without hairs, two

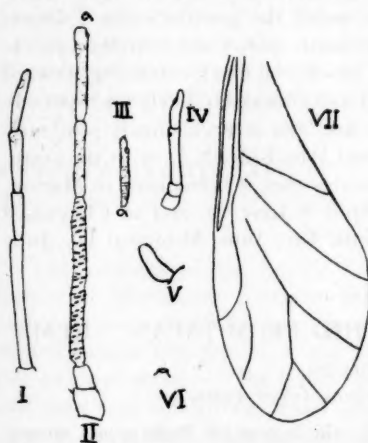


Fig. 6. *Neophyllaphis podocarpi* n. sp. I, antenna of wingless viviparous female; II-III, antenna of winged viviparous female; IV, antenna of immature form; V, lateral view of cauda of viviparous female; VI, cornicle of viviparous female; VII, wing of viviparous female.

basal segments very short, the third nearly as long as the fourth and fifth combined and bearing about 60 small, transversely narrowed sensoria scattered over the entire length, the fourth slightly shorter than the fifth and without sensoria, sensoria at the distal end of the fifth segment small and circular, the sixth as long as the fourth with a small, round sensorium near the apex, spur of last segment very short.

Wings not narrow, the third oblique vein twice branched. Abdomen without tubercles. Cornicles very small, much broader than long and broadest at base. Cauda large, rounded at apex, constricted at base and lightly so at middle. Anal plate sinuate. Legs moderately long, slender, and with a few short, fine hairs. Empodial hairs absent.

Colour dark reddish purple, eyes brownish red, and legs pale brown. Wings hyaline with brown veins.

Length of body 1.3 mm.; of antenna 1.1 mm.; of fore wing 1.7 mm.

Wingless viviparous female.—Body narrow, being broadest at middle, slightly pulverulent, and hairs absent. Frontal tubercles absent. Eyes very small. Beak slender and reaching beyond hind coxæ. Antennæ not reaching to tip of body, slender, and without hairs, third segment longer than the fourth and fifth combined, the fourth shorter than fifth, and the fifth subequal in length to the sixth, spur very short, sensoria absent excepting a single round one near apex of the fifth segment. Body without tubercles. Cornicles, cauda and legs as in the winged female.

Colour dark reddish purple, eyes black, antennæ and legs pale brown, cornicles black and cauda pale black.

Length of body 1.5 mm.; of antennæ 0.9 mm.

Winged male.—Third antennal segment bearing numerous transverse sensoria which are irregularly scattered over the entire segment; fourth, fifth and sixth segments with fewer similar sensoria.

Winged oviparous female.—Third antennal segment with numerous long, encircling transverse sensoria regularly placed; none on remaining segments except the usual distal ones on the fifth and sixth segments. Hind tibia swollen and bearing numbers of sensoria on basal half.

Type Locality.—Meguro, Tokyo, Japan.

As in *Neophyllaphis podocarpi* the oviparous females of *Greenidea kuwanae* Perg., *Trichosiphum tenuicorpus* Okag., and *Cervaphis quercus* Tak., are winged.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF
ONTARIO.

The fifty-sixth annual meeting of the Entomological Society of Ontario was held at Ottawa on November the sixth and seventh. The attendance was good and very representative of the national character of the Society, members being present from Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba and British Columbia. In addition to the Canadian members there were two welcome visitors from the United States: Mr. C. L. Marlatt, Assistant-Chief of the Bureau of Entomology, Washington D. C. and Dr. Summers of Massachusetts.

The programme, as the list of subjects given below will show, was not only a full one but covered a wide range of Entomology. Most of the papers were of an economic nature, but several—and these not the least interesting, eschewed the economic aspect altogether and gave instead the results of the observations and studies of the insect lover and naturalist.

The papers which aroused the most discussion were "The Chief Factors in Natural Control" by J. D. Tothill and "My Experience in Dusting and Spraying" by Father Leopold. It was very interesting to observe the difference of opinion as to the importance of such control factors as weather or climate, and scarcity of food supply. There was also a decided difference of opinion as to the best spray mixtures for apple orchards between the Nova Scotia men on the one hand and the Ontario, Quebec and British Columbia men on the other hand. The Nova Scotia Entomologists claimed that under certain weather conditions lime-sulphur applications caused a very noticeable drop of apples which lessened the size and value of their crop; the Entomologists of the other provinces claimed that in their respective provinces there was no evidence of this drop or of any lessening of the crop. Father Leopold's experience was in accordance with the latter view.

The symposium on the Cabbage Maggot was interesting and not only corroborated last year's evidence of the value of corrosive sublimate as a remedy for this pest, but also brought out several new and possibly equally good remedies. The results of further experiments with these next year will therefore be looked forward to with interest.

The popular evening lecture by C. L. Marlatt on "How the United States is preventing the Introduction of Foreign Insect Pests and Plant Diseases" was highly appreciated and felt to be of special value to Canadian Entomologists as was pointed out by the President of the Society when proposing a vote of thanks.

On the evening of the seventh the members and guests were entertained by the Ottawa Naturalists' Club at a smoker in the rooms of the University Club.

The officers for next year are:—President, Mr. Arthur Gibson; Vice-President, Mr. F. J. A. Morris; Secretary-Treasurer, Mr. A. W. Baker; Curator, Mr. G. J. Spencer; Librarian, Dr. C. J. S. Bethune; Editor, Prof. E. M. Walker. The list of papers read was as follows:—

1. Insects of the Season in Ontario—W. A. Ross and L. Caesar.
2. Insect Conditions in the Province of British Columbia—R. C. Treherne.

3. Results of some Preliminary Experiments with Chloropicrin—G. J. Spencer.
4. *Ephydra hians* and its Occurrence in Western Canada—Dr. C. Gordon Hewitt.
5. Our Common Cercopidae—George A. Moore.
6. Further Notes on the Control of the Pear Psylla—W. A. Ross and W. Robinson.
7. My Experience this year in Dusting and Spraying—Rev. Father Leopold.
8. The Chief Factors in the Natural Control of Insects—J. D. Tothill.
9. The Present Condition of the Balsam and Spruce Injury in Quebec—J. M. Swaine.
10. Recent Observations on Eastern Ticks.—S. Hadwen.
11. How The United States is Preventing the Introduction of Foreign Insect Pests and Plant Diseases—C. L. Marlatt.
12. Hopkins Bioclimatic Law—W. Lochhead.
13. On the Wings of the Wind—A. F. Winn.
14. Locusts in Manitoba with Special Reference to the Outbreak in 1919—Norman Criddle.
15. Ecological Notes on Certain Species of Locusts prevalent in British Columbia—E. R. Buckell.
16. Symposium on the Cabbage Root Maggot and its Control in 1919.—W. H. Brittain, R. C. Treherne, Arthur Gibson and L. Caesar.
18. Present Status of Pests of Canadian Flour Mills—E. H. Strickland.
17. Life-History of a Hobby Horse—Part II: Boy and Man—F. J. A. Morris.
18. Some Notes on the Life-History of our Common June Beetles—H.F. Hudson.
19. Further Notes on the Life-History and Control of the Strawberry Root Weevil—W. Downes.
20. The Strawberry Weevil—W. A. Ross.
21. Borers in Corn and other Field and Garden Plants which have been or may be mistaken for the European Corn Borer—Arthur Gibson.
L. C.

RECENT CANADIAN PUBLICATIONS.

(Continued from Vol. LI, p. 282.)

ANNOTATED CHECK-LIST OF THE MACROLEPIDOPTERA OF ALBERTA.—By Kenneth Bowman. Published by the Alberta Natural History Society. Red Deer, Alberta, 1919.

In this list the author has endeavoured to present in a concise form all the available data on the distribution of the Macrolepidoptera within the Province of Alberta. The work has an attractive appearance, being printed in clear type on a good quality of paper. The generic names, printed in bold-faced type, and followed by the specific names arranged in a column, each name preceded by its number in Barnes and McDunnough's check-list. Two columns follow, giving seasonal and geographical distribution respectively, the former

by numerals indicating months, the latter by abbreviations of locality names, in most cases single capital letters. Two of such treble columns occupy each page, and although a considerable amount of information is thus presented there is no appearance of crowding. Eight hundred and twenty species are listed, and it will be remembered that the "micros" are not included.

A comparison of this list with Winn's Quebec list brings out some interesting facts. The butterflies of Alberta (116 species) outnumber those of Quebec (84 species) by more than one-fourth of their number, while in all the other groups the Quebec list leads. There are more than twice as many Sphingidae in Quebec than in Alberta (33:15), five times as many Saturnioidae (10:2), and six times as many Sesiidae (12:2), while the differences in the Arctiidae (including Lithosiidae and Nolidae—37:34), Noctuidae (488:428) and Geometridae (193:167) are relatively slight.

DIRECTIONS FOR COLLECTING AND PRESERVING INSECTS.—By J. H. McDunnough. Circular No. 12, Entomological Branch, Dept. of Agriculture, Ottawa.

This circular gives brief directions for the ordinary methods of collecting and preserving insects and will be found useful, particularly to the novice. A description of the collecting outfit is followed by instructions for collecting the various orders of insects, preserving, mounting and shipping entomological specimens, and for their arrangement in the collection.

FROM THE AGRICULTURAL GAZETTE:—

The Pear Psylla.—By W. A. Ross. Vol. 5, No. 12, Dec., 1918. A brief account of the injuries caused by this pest, its life-history, natural and artificial control. It is illustrated by a plate on which the various stages and work of the insect are shown.

The History of the Codling Moth in British Columbia.—By R. C. Treherne. Vol. 6, No. 1, Jan., 1919.

Since 1905 at least 12, probably 13, distinct outbreaks of the codling moth have occurred in British Columbia at widely separated points, a marked increase in their numbers having taken place since 1912, coincident with a noted rise in the fruit-yielding capacity of the orchards of this Province. Vigorous action has been taken by the Provincial authorities to eradicate these outbreaks, the Dominion Entomological Branch acting in an advisory capacity during the past three years. At the close of 1918 codling moths are believed to exist in small numbers in the vicinity of Vernon, Okanagan Landing and Victoria, but have been nearly or quite exterminated from the other localities where outbreaks have occurred.

The operations undertaken wherever outbreaks are reported are described, including the procedure followed in the disposal of fruit in infested areas.

The Rose Midge in Ontario.—By Wm. A. Ross. Vol. 6, No. 2, Feb., 1919. A brief account of this pest, which has been known in Ontario only since 1914. Its life-history, the nature of its injuries, the varieties of roses attacked and methods for its control and prevention are described

The Balsam Injury in Quebec and its Control.—By J. M. Swaine. Vol. 6, No. 3, March, 1919.

This paper describes a serious condition of the Balsam Fir in the Province of Quebec, originating in an outbreak of the Spruce Budworm a few years ago, as a result of which the trees were killed over hundreds of square miles, and those not killed outright have subsequently fallen victims to other insect and fungus enemies. These are the Ground Rot (*Polyporus schweinitzii*), the Sap Rot, the Eastern Balsam Bark-beetle and the Eastern Balsam Weevil. The future of the balsam in the affected regions is not considered to be bright. Suggestions for improving the situation are dealt with under three headings: (1) Utilize the threatened balsam; (2) Burn the slash, and (3) Increase the percentage of spruce in the stand.

The Poplar Borer.—By R. N. Chrystal. Vol. 6, No. 4, April, 1919. This paper is the outcome of observations by the author on a case of serious damage to cottonwood on a ranch near Cowley, Alberta. It contains an historical account of the depredator (*Saperda calcarata*), descriptions of the larva and adult, and of their life-history and work. Remedial measures are suggested for dealing with outbreaks of the beetle on a large scale and for treating individual trees.

The Greenhouse Leaf-tyer (Phlyctænia ferrugalis Hbn.).—By Arthur Gibson. Vol. 6, No. 7, July, 1919. This is another European insect, known in Canada since 1899, and now widely distributed in the East. The caterpillars attack a wide range of greenhouse plants, particularly soft-leaved species. The life-history, injuries, enemies and methods of control are described.

An Infestation of Apple Sucker, Psyllia malis, Schmidb., in Nova Scotia.—By W. H. Brittain. Vol. 6, No. 7, 1919.

This is a new and very undesirable immigrant from Europe, which appeared in a severe outbreak at Wolfville, N.S. Full descriptions and figures of the adult and fifth nymphal instar are given. The injury is similar to that of the Pear Psylla, the really serious damage being caused by the nymphs only. At the season of its discovery the outbreak was too advanced to permit of saving the crop, but preliminary tests with a liquid spray (nicotine sulphate, one pint to 100 gallons of water, applied as a heavy drenching spray by means of a "Friend" gun) gave excellent results. Other tests were made with various contact dusts, but were less effective.

FROM THE OTTAWA NATURALIST:—

The Genus Vespa in Canada. Key to the species. By F. W. L. Sladen. Vol. XXXII, No. 4, Oct. 1918, pp. 71-72. Four new species are accorded, *V. norvegicoides*, *albida*, *acadia* and *atropilosa*.

Insect Galls and Gall Insects. By E. P. Felt, Albany, N.Y. Vol. XXXII, No. 7, Jan., 1919, pp. 127-131. A popular account of this subject, describing some of the structural and adaptive features of insect galls, the relations between gall insects and their plant hosts, the alternation of generations in the Cynipids and gall aphids, the apparent mimicry of some galls, occurrence of inquiline, etc. It is illustrated by two plates, showing characteristic forms of insect galls.

E.M.W.

(To be continued.)

Mailed January 27th, 1920

